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STRATEGIES AND POLICIES FOR THE DEVELOPMENT OF CONSULTING ENGINEERING SERVICES IN DEVELOPING COUNTRIES

Issue paper

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INTRODUCTION

1. The strategic significance of consulting engineering services as an enabling factor for industrialization and economic development is being increasingly recognized. They are the means by which project concepts are translated into industrial plants through successive application of intellectual inputs. Although they account for less than 10 per cent of investment costs, they none the less determine the efficiency and long-term viability of investment projects. The purpose of such services is to provide in each case, in the context of the specific economic and social environment of the country, the most effective solution for the realization of viable and competitive manufacturing facilities and the choice of technology and its adaptation. Consulting engineering services are the determinant of effective transfer of technology.

2. Consulting engineering services include techno-economic surveys leading to opportunity and feasibility studies; advice on available technologies; identification and selection of appropriate technologies; preparation of tender documents and appraisal bids; evaluation of technology; identification of plant and material suppliers; preparation of detailed plans for factory construction and installation of internal services; installation and commissioning of plant machinery and equipment; unpackaging of technology; and the provision of technical services for the proper operation and maintenance of plants to assure high productivity. All these activities are interlinked and require a multidisciplinary approach, necessitating the services of technologists, engineers, economists, scientists, environmentalists and financing experts. Large consulting engineering firms are in a position to provide the full range of these services, including financial packaging. Smaller consulting engineering firms capture market niches through specialization in segments such as pre-investment studies or in-depth knowledge of specific subsectors.

3. In industrialized countries, consulting engineering services provide considerable support to industry to achieve and/or maintain productivity, efficiency and competitiveness. They are also a significant source of the knowledge and skills related to the industrial and business disciplines. Consulting engineering services are linked to several aspects of industrial development such as identification of critical technological needs in line with adopted competitive strategies; technology transfer; disaggregation of technology; production efficiency; local engineering capability; and product and process innovation. Important benefits from the development of reliable and competent engineering services can be achieved through reduced engineering fees; identification of local plant facilities and equipment; reduced plant construction costs; development and adaptation of technology; promotion of related technology, especially for the machinery industry; personnel development; machinery exports etc. The benefits of consultancy engineering services extend beyond the benefits to individual users. They form part of the industrial and technological infrastructure of a country. They indeed make up a typical subsector of the knowledge industry and are to be regarded as an important development resource.

I. MARKET EVOLUTION

4. The market for engineering consulting services is a multi-billion-dollar-a-year market that is dominated by large firms based in industrialized countries and characterized by high entry barriers. Exports of services, which in 1992 amounted to one trillion dollars, or 20 per cent of total world trade, are growing fast and some think could equal or even overtake merchandise trade within 10 years. Significant cross-border trade is generated by business and technical services such as computing, accounting and engineering consultancy. In this market, the share of developing countries is merely 5 per cent, which is distributed unevenly in a limited number of countries.

5. One of the biggest problems in assessing trade flows in services is that the volume of such trade is seriously underestimated; government statisticians acknowledge gross underreporting of services exports, in some areas perhaps by as much as 50 per cent. One reason is that official balance-of-payments statistics have had great difficulty in keeping pace with developments in communications technology, which has spawned

a wide range of tradeable services and new means of payment. In addition, no one really knows at this juncture how much business is being done by local affiliates of foreign firms whose activities will be covered by the General Agreement on Trade in Services (GATS), which entered into force in January 1995 with the newly created World Trade Organization. On a worldwide basis it is estimated that such sales could amount to at least another one trillion dollars, perhaps considerably more.

6. With the growing diversification and sophistication of industry in developing countries and accelerated investment flows to them, the future demand for consultancy services can be expected to increase significantly. Several new demands are placed on such services in the context of the changed international industrial and economic environment. A large number of enterprises are being privatized in developing countries as well as in countries in transition to a market economy. Accompanying such privatization measures or independent of them, a considerable amount of restructuring and re-engineering of enterprises is in progress. The demand for services relating to industrial infrastructure such as power generation and telecommunications is increasing as a result of substantial investments in infrastructure. New forms of partnerships have emerged such as the build-operate-transfer (BOT) contracts, in regard to which consultancy services are necessary. Increasing micro-electronic and informatics applications in enterprises call for a special class of consultants who can provide advice to enterprises in this respect. The incorporation of environmental aspects in industrial projects and the design and installation of equipment to combat pollution place new demands on the consulting engineering services. According to the *Engineering News Record* (February 1994), investment in global environmental markets is expected to increase from US$ 379 billion in 1995 (it was US$ 330 billion in 1992) to US$ 518 billion in the year 2000.

7. By far the largest share of the demand from the developing countries for consulting engineering services is met by international consulting firms. Some developing countries, notably in Asia and Latin America, have developed a competitive edge in specific sectors and subsectors and have made some headway in exporting their services to other developing countries. Based on past capital investment and accumulated know-how, a number of large companies in these countries used the construction industry as a point of entry into the consulting engineering sector. They then were able to diversify into industrial projects in the sectors in which they had a comparative advantage, usually in a relatively mature technology. However, the participation of the developing countries in the market for these services is still low, for reasons that are described in chapter II.

8. In most developing countries the public sector, which has been by far the largest customer of consulting firms, tends to rely heavily on foreign suppliers of such services. Foreign firms have tended to supply the core technology with minimal input from local engineering consultants, which provide mainly general engineering services including civil engineering assignments (the situation may, however, vary from country to country).

9. This rigid division of responsibilities between local and foreign firms does not facilitate the synergies possible from the combination at the project level of local and foreign know-how. This combination, if effectively organized and managed, could help to transfer technology through training and other means at the project level, enabling local consulting and engineering services firms to learn and absorb the core technology of investment projects. Governments could provide incentives to local firms (e.g. tax concessions) to build up the required capacity in financial and human resources, including networking, to successfully embark on this process of technological upgrading.

II. CONSTRAINTS

10. The consulting engineering industry in developing countries is often constrained by a series of obstacles and an unhelpful or indifferent policy environment. Indeed, several developing countries lack adequate,

transparent and effective legislation and policies and procedures that foster the establishment and operation of local consulting engineering services. Other obstacles are as follows:

(a) A limited domestic market;

(b) The technology-intensive nature of these services and the need for subsequent continuous investment;

(c) The need for managerial and organizational skills that are weak in most developing countries;

(d) The fact that foreign donor agencies and countries tend to support their own firms in the provision of some of these services (often below cost). This is usually done in anticipation of gaining construction awards for entire projects. One example is the conduct and provision of feasibility and location studies. While these studies do not cost much (1-2 per cent of the value of an investment project), they do influence the selection of equipment, contractors and raw materials. This has made it more difficult for local firms in developing countries to compete against such foreign firms;

(e) The professional contacts and cooperative arrangements that foreign consulting and engineering services firms have with international equipment suppliers, contractors and financial institutions tend to give them a competitive edge.

11. Although the public sector continues to remain the primary client of the consulting firms in developing countries, Governments, despite their best intentions, have failed to allocate a share of the investment in development projects to domestic consulting enterprises.

12. In some developing countries, important sectors such as electric power, transport, steel, oil and petrochemicals are in the hands of the State and carry out a succession of investment projects. They have a steady need for consulting engineering services and tend to have their own consulting engineering capacity; independent local consulting engineering and design organizations are used to supplement this capacity when peaks of activity take place, whereas foreign consulting engineering and design organizations are employed as suppliers of basic engineering and very specialized services.

13. User awareness and user attitudes are critical for the development of a domestic consultancy engineering capability. Policies and promotional measures can help in this respect, but no less important is the quality of the services rendered by the domestic consulting industry and the nature of client relationship that is developed by the consultants. The users can be helped in a number of ways, one of which is to give them adequate information on the availability of consultancy services in the country and also on the modalities of making use of such services. Users will need information and assistance in regard to a number of matters, including the selection and evaluation of consultants, starting with a clear definition of the needs and problems for which they require consultancy assistance; formal contractual relationships, with a clear delineation of the responsibilities of consultants and the client; and issues of liabilities and remuneration. The factors relevant to the use of the consultants, some of which were covered in a manual prepared by UNIDO in the early 1970s, could now be reviewed and updated and made available to the users.

14. Financing has been and continues to be a critical constraint on the development of local consulting engineering firms in developing countries. One main disadvantage of firms in those countries is their very limited ability to provide financial packages along with engineering services, particularly for investments in projects for physical and social infrastructures. Foreign firms often have the support of, and enjoy access to, grants and other aid from their home countries. By contrast, in developing countries, macroeconomic measures such as high tariffs, restrictive foreign exchange regimes and the lack of collateral add to the problem of access to credit.

III. ELEMENTS OF A NATIONAL STRATEGY

15. In the light of the constraints outlined above, the Consultation may wish to highlight the key components of strategies and policies that balance the interests of all the parties concerned and thus lay the foundation for sustained growth of consulting engineering service industries. To respond effectively to the preoccupations outlined earlier, major changes in policies may need to be introduced in accordance with the specific needs of individual developing countries or groupings thereof. The formulation and pursuit of national measures would need to take into full account the opportunities offered by international cooperation, whether regional, South-South or North-South.

16. In all countries, including developing countries, consulting services could take various institutional forms, including consultancy firms in the public sector; captive consulting organizations of industrial groups; independent consulting organizations; small industry extension services; institutional consultancy, including universities and research institutes; in-house consultancy capabilities developed by large firms; and consultancy by retired persons. The provision of consulting services is indeed a question of organizing and interlinking human resources in a problem-solving mode.

17. Developing countries have a range of options for the promotion of consulting engineering services and many examples to draw upon. What is important is the selection of entry points suitable to each country. With developing countries as a class being at different stages of development, there have to be variations in approach. Countries in the earlier stages of industrial development with limited markets may hope to establish capabilities initially in a few fields. A transsectoral consulting engineering organization may have to be established when the demand for consultancy services is limited or fluctuating in specific sectors.

18. In all developing countries the needs of small and medium industry would require special attention. A diversified consulting facility easily accessible to small enterprises may have to be promoted and strengthened. The awareness of small and medium enterprises about the use of consultancy services is limited, and there may be reluctance on grounds of confidentiality. Moreover, such enterprises are unlikely to be able to pay high fees for consultancy services.

19. It has to be borne in mind that although developing countries have by and large deregulated their industries and let the private sector play a leading role in industrial development, a government strategy is still necessary to promote consultancy engineering capabilities, which should be considered as part of the industrial and technological infrastructure of the country and whose benefits go far beyond the benefits accruing to individual users. Many developing countries do not yet appear to have a clear policy on consulting engineering services, but it is important that they view those services as an industry and promote them as they would an industrial sector.

20. Several developing countries have, over the last two decades, taken measures to improve their local consulting capabilities. These measures and the results achieved could be reviewed. For example, the Government of India has established a consultancy development centre to promote and assist the consultancy profession, and its Planning Commission has established a consultancy development group. The Republic of Korea adopted laws relating to the promotion of engineering services. They stipulated that a domestic engineering company should be the prime contractor for engineering services, except when this was not feasible, and also required the registration of engineering firms and an annual report of their activities.

21. The approach of a developing country Government to the development of consulting engineering services can be viewed in three dimensions: the Government as the policy maker; the Government as a user; and the Government as a key contributor to the policies of national development financing institutions.

22. Public investment could serve as a springboard for developing national capacity. Subsequently, confidence in local firms could lead to the increasing use of their services in projects funded, either

multilaterally or bilaterally, by the public sector or by national, regional and international financing institutions. Government policies and incentives are the means by which demand could be increased and conditions of competitiveness established. National consulting enterprises organized in the private sector are well placed to interact with private enterprises and demonstrate their ability to provide services in a timely and cost-effective manner, thereby promoting demand for those services. Yet, demand for consulting assignments in a country reflects the level of industrialization and economic development that has been reached and the complexity of the managerial and administrative problems faced by the private and public sectors.

23. On the supply side, more use has to be made of universities as well as of polytechnics and specialized institutions, which should be encouraged to make their know-how available to local industry and fledgling engineering consulting firms. Training policies and programmes should aim at imparting skills for project design, planning and implementation, contract negotiation, production and production management to electrical, mechanical, construction and other engineers and technicians. That would create a cadre of specialists for the establishment and/or strengthening of national consulting engineering firms. Such training programmes and curricula are already available in some developing countries, but other countries must integrate the needs of the indigenous consulting engineering industry in their programmes of human resource development.

24. The consulting engineering services profession requires flexibility, mobility, exposure to technological changes and speedy operational decisions. Accordingly, procedures regarding technology acquisition and information, foreign exchange and the temporary employment of foreign experts should be simplified to allow local consulting firms to cooperate on a competitive basis.

25. Fiscal incentives and better access to finance are essential to stimulate the development of local consulting engineering firms. These incentives can take various forms, such as tax relief and reduced import tariffs on key equipment, particularly for informatics. Access to finance can be facilitated by modifying regulations on collateral. Tying industrial project loans to the involvement of local consulting firms in project execution is an indirect means by which financing institutions can promote local firms. Access to finance could be improved by encouraging the establishment of special "banking windows" for producer services, and the creditworthiness of firms in the sector could be strengthened by a system of government guarantees.

26. To strengthen the credibility of the consulting engineering profession, there is a need to pass laws to regulate membership of it. Such laws should be drawn up in consultation with national associations and should contain provisions for these associations to participate in policy-making relating to the profession.

27. To improve the quality of professional work and the image of the consulting engineering profession, an institutionalized process of dialogue must occur at the national, local and enterprise levels. Such a dialogue would create an environment conducive to the development of local technological capabilities and their effective utilization in industrialization. It might take the form of strategic consultative groups, which are most effective at the level of subsystems, where the network of economic relations is most direct and efficient. Such an initiative should reflect the needs and responsibilities of all actors in the industry, including small, medium and large contractors and specialized subcontractors, national consulting associations, financing institutions, public and private firms and those who make policy. There is a need for industry associations to be more involved with the consulting profession. One measure that could be undertaken in this respect is the provision of incubator facilities for consultants entering the profession.

28. Measures such as the ones mentioned above would have to be formulated and implemented with a long-term perspective and would need to link the development and use of consultancy services to other related aspects of industrial development. It might be useful to consider creating national consultancy promotion agencies that could also function as nodal points for international cooperation.

29. The role of the user in the development of consulting engineering services should not be overlooked. Individual enterprises should be made aware of the importance and availability of such services within a country. In this context, it might be useful to consider closer linkages between industry associations and consultancy services. In addition, fiscal incentives to users of domestic consulting services might have to be considered.

30. It must not be forgotten that the primary responsibility for the development of the profession rests on the profession itself, particularly with respect to ensuring quality standards and credibility. Eventually an interactive process must be set in motion involving the profession, its users and the Government.

IV. INTERNATIONAL COOPERATION

31. International cooperation is a key ingredient in the development and use of consultancy services in developing countries. Strategic alliances and joint ventures in the field of consulting engineering will need to be promoted actively. In this, some guidelines for developing country partners could be useful, particularly in relation to selection, contracting and training.

32. Foreign consultancy organizations may have to become sensitive to the need for using local resources and for adapting and possibly down-scaling their own operations.

33. In considering international cooperation, the Consultation may wish, *inter alia*, to discuss the implications of GATS as well as of the various regional integration processes currently under way.

34. The Consultation may also wish to pay special attention to the potential for cooperation among developing countries and the means by which such cooperation can be enhanced. Developing countries may wish to consider the establishment of joint ventures and strategic alliances among themselves for enhancing the development and use of consulting services. Cooperation among them may also pay particular attention to the need for information on the availability, credibility and training of consultants. The promotion of cooperation among developing countries in consulting engineering services must be also linked to the broader issues of promotion of investments, transfer of technology and trade among developing countries.

35. The Consultation may also wish to consider the creation and/or strengthening of regional networks in order to:

(a) Facilitate the formulation of national programmes, particularly for the enhancement of industrial consulting engineering services;

(b) Support the creation and/or reinforcement of national federations of industrial consulting firms;

(c) Assist in the mobilization of resources for the implementation of these programmes.

These networks should bring together existing institutions such as national and regional federations of consultants, regional financing institutions, government officials and other interested groups. They could be realized with the assistance of international bodies such as UNIDO.

V. ROLE OF THE UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

36. UNIDO has, since its inception, implemented technical cooperation projects in several developing countries to promote consultancy services in general or in particular sectors. In addition, it has carried out studies and convened expert group meetings to consider the issues involved. Nevertheless, it is important for

the Consultation to consider the role of UNIDO and other international organizations in the changed global industrial context. In addition to the provision of technical services, other measures such as the following might be considered:

(a) Consultation meetings in different industrial sectors could concentrate on the promotion of consulting services in those sectors in developing countries;

(b) Special measures could be undertaken under the ECDC/TCDC programmes;

(c) The creation, under the aegis of UNIDO, of a panel of experts to advise on issues related to the development and strengthening of the consulting engineering services industry in the developing countries on a continuing basis.

37. UNIDO, as the organizer of Invesmart and Techmart, could invite national consulting engineering firms to participate, with the aim of eventually involving them in any resulting project.* National project planners and technology seekers could be sensitized to the fact that the technologies to be transferred often need to be modified to satisfy local conditions, for example, scaling down or adaptation to locally available raw materials and manpower.

VI. POSSIBLE ISSUES FOR CONSIDERATION

38. To arrive at specific conclusions and concrete recommendations for action, and following the discussions and proposals made above, a suggested list of issues is provided below:

(a) What are the implications for consulting engineering services in the context of the changed international macroeconomic environment and emerging international concerns? What additional demands are being placed on the profession and what additional skills and experience are needed? What is the emerging profile of demand for consultants in developing countries? Relevant trends include the incorporation of environmental considerations into industrial projects, privatization, the restructuring and re-engineering of enterprises and the growing importance of BOT contracts. The implications of GATS must also be considered;

(b) How can local consulting engineering services be established and developed, and how can existing ones be strengthened to make them competitive in their domestic markets and possibly in international ones? What elements should go into a national strategy to promote local consultancy capabilities? This would include incentives and facilities for the consultancy profession, the preparation of national directories of consultants and the role of industry associations. What are the entry points for countries at different stages of development? What is the role of users and the profession itself? The implications of GATS would need to be taken into account in formulating a national strategy;

(c) How can consultancy facilities for small and medium-scale industry in developing countries be enhanced? Local knowledge and easy access are essential for consulting services, as are low costs;

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*Invesmart is an investment forum that aims primarily at initiating direct contacts between enterprises of a developing country and potential foreign partners to discuss investment projects that have been identified beforehand in a specific number of industrial subsectors. The main activity of Invesmart consists of setting up individual business meetings between potential partners who have expressed their interest in the project presented. Techmart is a business forum where small and medium-scale industries can find, offer, negotiate and eventually buy and sell the kind of technology that is suitable for their operations. A Techmart event provides a unique setting for the conclusion of practical business arrangements.

(d) Fiscal incentives and better access to finance are essential to the development of local consulting engineering firms. Which operational mechanisms should be developed by the financing institutions and their clients/partners to improve access to credit and overcome the collateral problem?

(e) How can international cooperation be promoted in the development and use of consultancy services? How can access to such services be enhanced? What are the terms and conditions under which consultancy services can be acquired? What are the prerequisites for effective joint ventures in the field of consultancy engineering services?

(f) What is the scope for cooperation among developing countries in the development and use of consultancy engineering services? How can information flows in this respect be enhanced? What measures need to be undertaken by the Governments and the consultancy profession? What are the implications of regional integration processes? Could regional networks of consulting organizations be formed?

(g) How could UNIDO act to enhance international cooperation in the development and use of consultancy engineering services? What are the key areas to be addressed in this regard?